

REMARKS/ARGUMENTS

Applicant thanks Examiner for the detailed Office Action dated March 17, 2006. In response to the issues raised, the Applicant offers the following submissions and amendments. Furthermore, we enclose a Terminal Disclaimer linking the term and ownership of any patent granted on the present application to that of co-pending USSN 10/773,192.

Amendments

The Abstract has been amended to remove 'claim-like' language such as 'comprising'.

Accordingly the amendments do not add new matter.

Abstract

As discussed above, we believe that the amended Abstract provides a clear and concise description of the disclosure in compliance with 37 CFR 1.72.

Double Patenting

Claims 1-54 stand provisionally rejected as not patentably distinct from claims 1 to 54 USSN 10/779,192 in view of US 5,905,517 to Silverbrook. We assume that the Examiner intended to cite co-pending USSN 10/773,192 to the Applicant. If this is not the case, please let us know.

As discussed below, we believe that there is no motivation for the ordinary worker to combine '192 with '517. The '517 disclosure strenuously teaches away from ejecting ink by generating vapor bubbles. This is explained in greater detail below. However, in the interests of expediting prosecution, we have enclosed a Terminal Disclaimer.

Claims – 35USC§103

Claims 1 and 19 *inter alia* stand rejected as obvious in light of US 4,797,692 to Ims, in view of US 5,905,517 to Silverbrook in further view of US 5,831,648 to Mitani et al. The Applicant contends that there is no motivation in the cited reference to combine their respective teachings.

Ims uses hexane suspended in a water-based ink to act as a bubble nucleation trigger. This lowers the temperature at which the heater 18 generates a bubble. The printhead is a 'side shooter' that ejects drops parallel to the plane of deposition (and hence the plane of the heater element 18). There is no recognition that shaping the pressure pulse in the ink can provide a more accurate drop trajectory. Likewise there is not discussion of cavitation corrosion or shaping the heater to avoid it.

Mitani is also uses bubble generation to eject ink. However, Mitani explicitly teaches the use of an asymmetrical heater section for the bubble to move while it grows and subsequently collapses. However, it does not disclose a bubble collapse point space from the heater element, only that the collapse point is spaced from the nucleation point. In fact, Fig. 17D suggests that the collapse point avoids the heater (103). The addition of protective layers 22 and 23 suggest that the bubble does not avoid the heater. Again there is no discussion of shaping the pressure pulse using heater configuration to achieve a more accurate drop trajectory.

Silverbrook discloses an alternative drop ejection mechanism. By heating the rim of the nozzle, the surface tension of the ink lowers so that the meniscus bulges further from the nozzle. The drop is then finally separated from the nozzle by a different means (four possible options are listed at col.5, ll 60-65). This arrangement avoids the need to generate bubbles by vaporizing the ink. As discussed in col. 6, ll. 39-52, the thermal inkjet printheads at that time were extremely inefficient in converting input electrical energy into the kinetic energy of ejected drops. Accordingly, Silverbrook studiously teaches away from the Ims and Mitani disclosures.

Mitani does not teach a bubble collapse point spaced from the heater and none of the references provide the ordinary worker with an incentive to combine their respective disclosures to derive the present invention. Accordingly, claims 1 and 19 are patentably distinguished from the cited art. It follows that dependent claims 12 and 31 are likewise novel and non-obvious.

Pursuant to the above, the additional references cited against the other dependent claims do not provide the motivation to combine Ims, Mitani and Silverbrook. Therefore, these claims are also patentable.

Claims 38 and 48 stand rejected as obvious in light of Ims, Mitani and Silverbrook, in further view of US 4,549,191 to Fukuchi et al. For the reasons set out above, Ims, Mitani and Silverbrook do not motivate the reader to combine their teachings. Mitani does not disclose that the bubble collapse point is spaced from the heater element. Fukuchi does not remedy these deficiencies. Accordingly, claims 38 and 48 are patentable over the citations. The claims depending from claim 38 are therefore also novel and non-obvious.

It is respectfully submitted that the Examiner's rejections have been successfully traversed. Accordingly, favorable reconsideration is courteously solicited.

Very respectfully,

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